

FREEZE TOLERANT FUEL CELL POWER PLANT WITH A
DIRECT CONTACT HEAT EXCHANGER

Abstract of the Disclosure

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A power plant (10) includes at least one fuel cell (12), a coolant loop (18) including a freeze tolerant accumulator (22) for storing and separating a water immiscible fluid and water coolant, a direct contact heat
10 exchanger (56) for mixing the water immiscible fluid and the water coolant within a mixing region (72) of the heat exchanger (56), a coolant pump (21) for circulating the coolant through the coolant loop (18), a radiator loop (84) for circulating the water immiscible fluid through
15 the heat exchanger (56), a radiator (86) for removing heat from the coolant, and a direct contact heat exchanger by-pass system (200). The plant (10) utilizes the water immiscible fluid during steady-state operation to cool the fuel cell and during shut down of the plant
20 to displace water from the fuel cell (12) to the freeze tolerant accumulator (22).